

REPORT BY THE
AUDITOR GENERAL
OF CALIFORNIA

**THE STATE COMMITTED \$50 MILLION TO
BUILD THE SOUTH GEYSERS GEOTHERMAL
POWER PLANT WITHOUT ASSURING THAT
SUFFICIENT STEAM WAS AVAILABLE**

REPORT BY THE
OFFICE OF THE AUDITOR GENERAL

P-483

THE STATE COMMITTED \$50 MILLION TO BUILD THE
SOUTH GEYSERS GEOTHERMAL POWER PLANT WITHOUT
ASSURING THAT SUFFICIENT STEAM WAS AVAILABLE

MARCH 1985



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Auditor General

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Office of the Auditor General

660 J STREET, SUITE 300
SACRAMENTO, CA 95814

March 25, 1985

P-483

Honorable Art Agnos, Chairman
Members, Joint Legislative
Audit Committee
State Capitol, Room 3151
Sacramento, California 95814

Dear Mr. Chairman and Members:

The Office of the Auditor General presents its report concerning the Department of Water Resources' South Geysers geothermal power plant which will not operate as scheduled in June 1986. The department did not adequately test the supply of steam before deciding to build the plant and has recently determined that the property does not contain enough steam. The department has delayed awarding the contract for completion of the plant while it investigates alternatives for obtaining a sufficient amount of steam. As a result of the delays, the users of state water will pay an estimated \$2.9 million more for the plant.

Respectfully submitted,

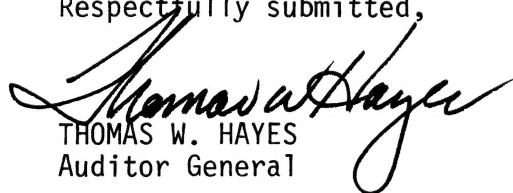

THOMAS W. HAYES
Auditor General

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In 1981, the department became aware that there might be problems with the supply of steam for the South Geysers plant. In June 1981, consultants for Pacific Gas and Electric Company (PG&E) informed department officials that the steam supplier for a PG&E plant located near the South Geysers plant was having difficulty obtaining enough steam for that plant. They suggested that the department might have similar problems with the South Geysers plant. In addition, the department's steam supplier drilled more wells on the South Geysers property in 1984 but did not find sufficient steam to warrant continued drilling operations. Finally, in July 1984, the department contracted for an independent analysis of the supply of steam on the property. That analysis indicates that there is only enough steam on the property to generate 29 of the 55 megawatts that the plant is designed to produce. As a result of the problems in producing steam for the plant, the department has delayed awarding the contract to complete the plant.

The department is currently considering several options for the South Geysers plant. It may attempt to purchase steam from another supplier, or it may combine the steam available on the property with steam from another supplier to operate the plant. Because completion of the plant has been delayed, the department estimates that the plant will cost \$2.9 million more than originally planned. The users of water from the State Water Project will pay more for the plant as a result of increased costs.

The State Energy Resources Conservation and Development Commission (commission) approved the South Geysers plant for construction in November 1981. However, because the department filed the application for certification under commission rules providing for an 18-month certification process, the commission was not required to determine that sufficient steam existed on the property before approving the application.

The commission has recognized that current regulations allow builders to apply for certification for geothermal power plants without demonstrating that adequate steam supplies exist. The commission is considering proposed changes to state regulations to require all applicants to assure the existence of adequate steam supplies.

INTRODUCTION

The Department of Water Resources (department) is responsible for protecting, developing, and managing California's water. In addition, the department is responsible for supplying water suitable for use in households, agriculture, industry, and recreation as well as for use in generating power and in supporting fish and wildlife. The department is also responsible for building and operating the State Water Project. The department's 1985-86 budget of \$699 million included \$524.5 million for the construction and maintenance of the State Water Project.

The State Water Project, which consists of dams, water storage facilities, aqueducts, pumping stations, and electric generating facilities, transports water from northern California to central and southern California. Thirty agencies located throughout the State purchase water under water supply contracts with the department. Payments to the department for water finances the State Water Project's planning, construction, operation, and maintenance. Money from the State's General Fund is not used to finance the State Water Project. In 1982, the department projected that by 1986, deliveries of water to agencies under contract would total 2.7 million acre feet.* The State Water Project is intended ultimately to provide about 4.2 million acre

*An acre foot of water covers one acre of land to a depth of one foot and equals 325,900 gallons.

feet of water per year. A major part of the financing has been through the sale of general obligation bonds. Other portions of the State Water Project, including some power facilities, have been financed by the sales of revenue bonds.

Until March 31, 1983, the department obtained about 80 percent of the electricity that it used to operate the State Water Project from entitlements for power from Canada and through purchases from Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas and Electric Company, and the Department of Water and Power of the City of Los Angeles. However, on that date, the contracts with these suppliers expired. In preparing for the expiration of the contracts, the department had planned for alternative sources of power, including the construction of geothermal power plants.

To generate some of the electricity needed for the State Water Project, during the 1970s, the department investigated the possibility of developing geothermal resources at seven locations in the State. Following preliminary consideration, the department decided not to build plants at several locations. It canceled plans to develop geothermal power in Imperial County because it did not believe that generating facilities could be operated economically. It proposed a power plant at Honey Lake, east of Susanville, in Lassen County. That plant would have used hot water from wells to preheat water for a boiler and to dry wood waste for fuel. After investing \$200,000 from a federal Department of Energy grant in feasibility studies, the

department canceled plans for the plant because it could not negotiate an acceptable agreement with the developer of the property. The department considered a total of four plants for the Geysers area of Sonoma and Lake counties but canceled one plant because the company that would have supplied steam for the plant could not obtain the proper permits to drill for the steam. For another plant, the department purchased mineral rights, including the rights to steam, from the federal Bureau of Land Management for \$2.8 million. The department delayed signing agreements to build a plant on that property pending satisfactory progress on two other plants, both in the Geysers area.

In 1980 and 1981, respectively, construction of the other two plants, Bottle Rock and South Geysers, was certified by the State Energy Resources Conservation and Development Commission (commission), which is responsible for approving sites for thermal electric power plants. Both plants are now under construction. Each is designed to produce 55 megawatts of electricity. The department had scheduled the Bottle Rock plant to begin operation early in 1985. It expects to have spent \$93 million for the plant by the time the plant is completed. However, the department has delayed completion of the South Geysers plant because it has not been able to obtain assurance that an adequate supply of steam can be found to operate the plant.

SCOPE AND METHODOLOGY

We reviewed the department's policies and procedures for developing and constructing geothermal plants to provide power for the State Water Project. We also reviewed the procedures that the commission uses to certify geothermal power plants, focusing on the certification process used for the South Geysers plant. We also examined the alternatives available to the department if the supply of steam at South Geysers is, in fact, inadequate.

To determine why the department decided to develop its own geothermal power sources for the State Water Project, we reviewed the events leading up to this decision. To evaluate the department's contracts with the steam suppliers at Bottle Rock and South Geysers, we compared the contracts with similar contracts between other geothermal power plant operators and their steam suppliers. We also reviewed the department's decision to begin construction on the projects by comparing the department's decision-making process with the decision-making processes that other geothermal power plant operators in the Geysers area used to reach their decisions to begin construction. We interviewed officials at the Department of Conservation's Division of Oil and Gas to gain an understanding of the elements involved in analyzing steam supplies. Finally, we reviewed internal documents and reports to determine the effect of the delay in construction at South Geysers on those using water from the State Water Project.

In evaluating the two processes available for certifying geothermal power plants, we reviewed the Public Resources Code and the California Administrative Code. We interviewed commission officials and technical staff to understand the different requirements of the processes and to determine why the commission did not require the department to provide evidence of sufficient steam to operate its proposed South Geysers plant before the commission certified the plant. Additionally, we reviewed the files and the transcripts of public hearings held by the commission on the South Geysers plant to determine if the construction of the plant would raise public concerns. We also wanted to know how the commission had dealt with any concerns that had been raised. Finally, we interviewed staff counsel at the commission about the internal and external processes that the commission used to propose amendments to its regulations for approving sites for power plants, and we determined when the new regulations would become effective.

AUDIT RESULTS

I

THE STATE COMMITTED \$50 MILLION TO BUILD THE SOUTH GEYSERS PLANT WITHOUT ASSURING THAT SUFFICIENT STEAM WAS AVAILABLE

The State has committed \$50 million and expects to spend about \$30 million more to complete its geothermal plant at South Geysers. The Department of Water Resources (department) committed the \$50 million to construct the plant without first determining if there was sufficient steam available to operate the plant. Since the steam supplier has not yet located sufficient steam to power the plant at the capacity for which it was designed, the contract for completion of the plant has been delayed. As a result, the plant will not operate in June 1986 as scheduled, and those using water from the State Water Project will pay an estimated \$2.9 million more for the plant because of the delay.

In February 1977, the department sent a letter to each of the 30 potential suppliers of geothermal steam in California to determine if they had any interest in selling steam to the department. One of those suppliers, Geothermal Kinetics, Inc. (GKI), responded that it was interested. GKI leases the rights to minerals on property in Sonoma County in an area known for producing geothermal steam. GKI had drilled one well on the property and indicated to the department that it wished to discuss the possibility of a contract for the sale of the steam. (See the Appendix for the location of the Geysers Area.)

The department signed an agreement in December 1977 with GKI to purchase steam for the proposed South Geysers plant. The agreement is typical of agreements entered into by other builders of geothermal power plants, including Pacific Gas and Electric Company and the Sacramento Municipal Utility District. It requires the department to build and operate a power plant of 55 megawatts, and it requires GKI to drill, operate, and maintain all the necessary steam wells and all the collecting and processing facilities needed to deliver steam of the quantity and quality necessary to operate the plant at a capacity of 55 megawatts.

The agreement specified that the department would construct the plant at the same time that GKI was developing the supply of steam so that neither the department nor GKI was required to invest more than necessary to meet the obligations of the agreement. It also specified that GKI would have developed enough steam to operate the plant at a capacity of 55 megawatts eight months before the date the plant was to begin commercial operation and that GKI must immediately notify the department if it believed that it would not be able to deliver the steam on schedule and in the required quantities.

Under the agreement, the department was not committed to building the plant or purchasing steam until it had determined that the steam resources could be developed as provided under the contract's terms. The department was to determine whether the steam resources could be developed within six months of signing the agreement.

However, because the department learned from a consultant that the one well drilled on the property was not sufficient to indicate whether enough steam would be available to power the plant, the department and GKI agreed, in June 1978, to amend the agreement. The amendment required GKI to drill two additional wells on the property and the department to determine, within three months of receipt of the test data from the wells, whether the supply of steam would support the plant.

The Department Did Not Adequately Analyze
the Availability of Steam for the Plant

Although GKI drilled additional wells on the property, the wells did not explore enough of the property to show that there would be sufficient steam to operate the plant. By relying only on the test data from these wells and on information about wells on neighboring properties, the department did not adequately analyze the availability of steam on the property. As a result, the department decided to commit to building the plant without knowing whether there would be enough steam to operate the plant at 55 megawatts.

Under the terms of the June 1978 amendment to the agreement, GKI drilled two additional wells on the property. However, GKI drilled these wells in the same area of the property and in the same direction as the original well. Therefore, GKI explored only one part of the property. The oil and gas supervisor and the geothermal officer of the Department of Conservation's Division of Oil and Gas agreed in our

discussions with them that by exploring only the northern part of the property GKI did not adequately test the steam supply of the entire property. A department attorney, who was a deputy director of the department when the two wells were drilled, said that the department might have exercised more influence on GKI's selection of the location for the additional wells. He added, however, that the contract might have prevented the department from attempting to manage the development of the steam supply. Based on test data that GKI obtained from the wells drilled on the lease and on information about the amounts of steam produced by other wells in the area, the department decided to make the commitment to GKI to build the plant. However, we believe that an analysis by an independent expert in geothermal resources should have been performed to determine if the lease was capable of producing enough steam for the plant.

Other builders of geothermal power plants believe that independent analyses of steam supplies by experts in the geology of geothermal steam resources are needed before power plants are built. The chief siting engineer from Pacific Gas and Electric Company (PG&E) told us that PG&E would not commit to building a power plant without such an analysis by an independent consultant. The administrative coordinator for the Sacramento Municipal Utility District's geothermal program also told us that such an analysis was essential. The Sacramento Municipal Utility District had contracted for independent analyses of the steam supplies for plants that it is involved in and would not build a geothermal plant without them.

The department intended to have the steam resource for the South Geysers plant analyzed, but it did not award a contract for an analysis before construction on the plant began. On September 18, 1979, the department issued a request for proposal for the analysis of the potential steam supply on the property and on September 24, 1979, it received a proposal from a firm to perform the analysis for \$25,900. However, on October 16, 1979, the former Chief of the department's Energy Division responded in a letter to the firm that the analysis was not required. We asked the Chief of the Energy Division's Geothermal Section why the division officials at the time had decided not to award a contract for the analysis. He told us that the proposal was too broad. Department documents show that he recommended rejecting the proposal because it called for more work than the request required and therefore did not respond to the request.

We reviewed both the request for proposals and the proposal and concluded that the proposal responded to the request and that the department could have awarded the firm a contract for the analysis. Nevertheless, the department decided in December 1979 to proceed with the plant after reviewing GKI's test data from the three wells and after concluding that wells on properties adjacent to the South Geysers property indicated that the property would produce steam. In deciding to proceed with the plant, the department did not follow the practice common to the industry of obtaining a reasonable assurance from outside sources that enough steam could be produced. The department has recently had an independent analysis done on the property. This

analysis shows what an earlier analysis would also have revealed: the three wells did not indicate that the property would yield enough steam for the plant. An earlier analysis might have indicated the need for more test drilling.

By mid-1981, the department began to receive indications that the steam from the property might be inadequate. In June 1981, consultants for PG&E met with the Chief of the department's Non-Renewable Resources Development Branch and a department consultant. PG&E's consultants told the department of problems that PG&E was having in locating enough steam for one of its plants on property adjacent to the South Geysers property. The consultants suggested that the department might have similar problems with the property for the South Geysers plant. However, a consultant to the department reviewed the PG&E report and disagreed with PG&E's consultants, concluding that the department might not have similar problems with the South Geysers property. In November 1981, the State Energy Resources Conservation and Development Commission approved the department's request for certification for the plant, and in June 1982, the department awarded the first contract for constructing the plant.

The Department Has Delayed Completion
of the Plant Because of Difficulties
in Producing Sufficient Steam

Although the department has awarded 13 contracts for construction of the South Geysers plant, it has delayed the award of

the final contract to complete the plant. The department canceled the opening of bids on the final contract because the steam suppliers encountered further difficulties in producing steam on the property. As a result of the delay, it will now cost an estimated \$2.9 million more to complete the plant.

As mentioned previously, the agreement between the department and GKI requires GKI either to produce sufficient steam to operate the plant eight months before the date the plant is to begin commercial operation or to notify the department immediately if it believes that it cannot supply the required amount of steam on schedule. However, after drilling the two additional test wells in 1979, GKI did no further drilling to develop the steam supply on the property until March 1984. The Chief of the department's Geothermal Section told us that GKI had not drilled because it had had difficulty financing more development work. A department attorney told us that GKI had applied for bank loans guaranteed by the federal Department of Energy, but before the applications could be approved, the program for such loan guarantees was eliminated. GKI then sought an arrangement with another company to drill on the property and share in the potential profits from the sale of steam.

On March 1, 1984, the department signed an amendment to the steam supply agreement permitting GKI to assign a portion of its interest in the lease to TCPL Geothermal, Ltd. (TCPL). TCPL began drilling later that month on a previously unexplored part of the

property. However, by June 22, 1984, the department believed that TCPL had not succeeded in finding sufficient steam, and the department canceled its plans for receiving bids on the contract for the plant's completion. On July 1, 1984, the department awarded a contract to a consultant to assess the potential production of steam on the property. The consultant's report indicates that the property can produce enough steam to generate only 29 of the 55 megawatts of electricity that the plant is designed to produce. Concerned about the lack of progress, the department's deputy director wrote to GKI in September and October 1984 asking whether GKI intended to fulfill its obligations to complete the development of the steam supply. As of the end of January 1985, the department had not yet received a response from GKI.

Because the department has not yet determined that enough steam will be available for the plant, it has delayed taking bids on the contract to complete the plant. The department estimates that a delay of one year in the award of the contract will add \$2.9 million to the cost of completing the plant.

At present, construction contractors are working on the plant, and the department is exploring the options available for solving the plant's problems. An option that the department considered was to terminate the 13 contracts under which work is presently progressing. However, the department found that the State cannot legally terminate the contracts because the contracts do not provide for termination for the convenience of the State. A department attorney told us that such

provisions are not usually added to contracts that are bid competitively since they might cause contractors to raise their bids. Furthermore, the department has concluded that the costs involved in terminating or suspending the contracts would be approximately the same as completing the work. Therefore, the department has concentrated on obtaining a supply of steam for the plant from sources other than GKI if necessary.

One option for obtaining sufficient steam for the plant is for the department to terminate the agreement with GKI and purchase all the needed steam from other sources in the Geysers area. Another option is to amend the steam supply contract with GKI to require GKI to supply the amount of steam currently available on the property and purchase the balance necessary to operate the plant at 55 megawatts from other sources. The department has reviewed the alternate sources of steam and has determined that Union Oil Company is the source most likely to meet the department's needs. Union Oil Company controls the rights to most of the geothermal steam in the Geysers area but has committed the steam under contract to PG&E. The Chief of the department's Energy Division has discussed with Union Oil Company and PG&E the possibility of purchasing enough steam to operate the South Geysers plant. PG&E has indicated that it would not object to Union Oil Company's selling steam to the department, if the sale did not affect the supply of steam for a plant that PG&E has proposed.

II

ONE STATE CERTIFICATION PROCESS FOR GEOTHERMAL POWER PLANTS DOES NOT REQUIRE PROOF THAT SUFFICIENT STEAM EXISTS BEFORE APPROVAL

The State Energy Resources Conservation and Development Commission (commission) approved the sites for Bottle Rock and South Geysers projects. The Department of Water Resources applied for approval to build the plants under the commission's 18-month Notice of Intent/Application for Certification process, which does not require the applicant to demonstrate the availability of steam reserves sufficient to supply the proposed project. As a result, applicants may build geothermal power plants that will not operate because supplies of steam are not sufficient to power them.

The commission, created in 1975 by the Warren-Alquist State Energy Resources Conservation and Development Act, is responsible for approving the sites of major electric power plants, forecasting energy supplies and demands, and developing energy conservation. Additionally, the commission conducts research in energy consumption and conservation, the development of energy supplies, and the technology used in locating sites for thermal power plants. The commission has exclusive jurisdiction over generating facilities that have capacities of 50 megawatts or more and that use any source of thermal energy. It also has jurisdiction over the power lines transmitting electricity from thermal power plants located in the State

to existing sets of power lines. Since 1978, the commission has considered certification for 13 geothermal power plant projects: five plants are operating; five are under construction; two are still in the certification process; and one application was withdrawn before the certification process could be completed.

Two certification processes are available to applicants seeking the commission's approval of geothermal power plant projects. One process, the first that the commission offered, requires 18 months and proceeds in two stages. This process does not require the commission to determine that sufficient steam exists for a project. A more recent process requires only 12 months and proceeds in one stage. This process requires that the commission determine at the outset that sufficient steam resources are available to operate the proposed plant. Applicants may use either process.

Section 25500 of the Public Resources Code establishes the commission's authority for certifying power plants. Beginning in 1978, the commission used an 18-month process for certifying geothermal plants. That process requires a 9-month Notice of Intention (NOI) proceeding followed by a 9-month Application for Certification (AFC) proceeding. In the NOI proceeding, the commission considers the need for the project, the project's environmental, safety and health effects, and the project's compliance with applicable laws. Applicants present this information to the commission in informational hearings, presentations, and adjudicatory hearings. A report of the NOI process

summarizes the information gathered in the hearings, defines the issues yet to be resolved, and transmits findings and conclusions on the topics covered. As a result of the NOI process, the commission issues a preliminary decision about the acceptability of the project.

During the AFC process, the applicant submits detailed plans describing the measures proposed to protect the public from the project's adverse health and safety effects, to maintain high quality environmental standards, and to comply with all applicable laws. The commission's staff evaluates the applicant's plans for completeness and adequacy. Other agencies that have expertise in the area or that regulate matters affecting health, safety, or the environment also evaluate the plans. After the commission has considered the applicant's plans, staff and agency evaluations, and public comments, the commission issues a final decision specifying the conditions under which the applicant may locate, construct, and operate the project.

Section 25540.2 of the Public Resources Code provides for a 12-month AFC process for geothermal power plants. This shortened process became available in January 1979; it was amended in September 1979 to require a public hearing on the supply of steam within 30 days of the date that applicants file an application. The purpose of the hearing is to determine whether the proposed site is reasonably capable of supplying steam in sufficient quantities to operate the plant at its proposed generating capacity over the life of the project. During the hearing, the applicant presents evidence to

support its contention that sufficient steam is available at the site. In addition, the Department of Conservation's Division of Oil and Gas, through an interagency agreement with the commission, presents its conclusions regarding the availability of steam for the project.

In October 1979, the Department of Water Resources filed the Notice of Intention with the commission as the first step in requesting certification for the South Geysers project. The commission issued its decision granting certification in November 1981. However, because the department filed the NOI and AFC using the 18-month process, the commission did not require that the department provide assurances that there would be sufficient steam available for the plant.

Although the 18-month process does not require the applicant to prove that sufficient steam is available for the project, the applicant is required to present information in the NOI about the quality of the steam taken from test wells. The commission's technical staff uses this information to evaluate the effects of the plant on the environment and on air quality but not to determine if there is enough steam. However, the 18-month process does not explicitly preclude the commission from asking about the adequacy of the steam supply. At a public hearing during the South Geysers AFC process, a representative of the owner of land adjacent to the South Geysers project questioned the availability of steam for the project. At a subsequent hearing, however, the commission's presiding committee member told the

representative that a determination of the sufficiency of the steam supply was not within the commission's jurisdiction under the 18-month process.

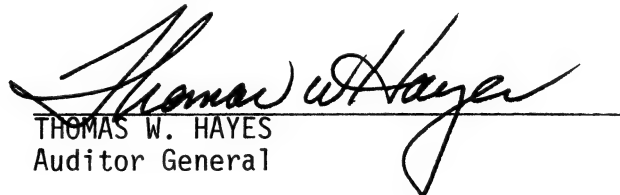
All applications received by the commission since the department filed its application for South Geysers have been filed under the 12-month process instead of the 18-month process. Nevertheless, the commission recognizes that the 18-month process is inadequate and has proposed amending the 18-month process. The proposed amendment requires that applicants prove that sufficient steam exists for proposed projects either in the NOI or, at the latest, within 30 days after the applicant files the AFC. In the proposed statement of reasons for changing the power plant siting regulations, the commission referred to the South Geysers project and stated that the changes are necessary to ensure that no geothermal project is certified unless there is substantial evidence that sufficient steam resources will be available to meet the needs of the plant. The commission held its first public hearing on proposed changes to the power plant siting regulations on January 24, 1985, and it expects the amendments to become effective by July 1985.

the necessary supplies of steam. Upon receipt of firm commitments for a supply of steam, the department should advertise and award the contract for completion of the plant at the earliest possible date to avoid additional delays and cost increases.

To avoid certifying projects that do not have sufficient steam, the State Energy Resources Conservation and Development Commission should adopt the proposed amendments to its regulations to require that applicants using the 18-month process provide assurances that sufficient steam is available for the proposed plants.

We conducted this review under the authority vested in the Auditor General by Section 10500 et seq. of the California Government Code and according to generally accepted governmental auditing standards. We limited our review to those areas specified in the audit scope section of this report.

Respectfully submitted,


THOMAS W. HAYES
Auditor General

Date: March 18, 1985

Staff: William S. Aldrich, Audit Manager
Anthony F. Majewski
Donald A. Davison

Memorandum

To : B-24
Mr. Thomas W. Hayes
Auditor General
Office of the Auditor General
660 J Street, Suite 300
Sacramento, CA 95814

Date : MAR 11 1985

File No.:

Subject : South Geysers
Geothermal Power
Plant

From : Department of Water Resources

The Secretary of the Resources Agency has requested that I reply directly to you on your draft report P-483 concerning the South Geysers Geothermal Power Plant.

It is impossible to determine that sufficient steam can be produced from beneath a specific parcel of land in the Geysers without actually drilling all of the required production wells. Such a drilling program is not the industry practice and, in fact, has never been undertaken prior to beginning construction of a geothermal power plant. While reasonable men may differ on whether "enough" was done to lessen the risk of a poor steam supply, the fact remains that your report is correct in stating that the Department is faced with the problem of securing an adequate supply for the power plant.

We concur with your recommendations and have been taking actions that will implement them.

for Alex R. Cunningham
David N. Kennedy
Director
485-6582

cc: A-38
Honorable Gordon K. Van Vleck
Secretary for Resources
The Resources Agency
1416 Ninth Street
Sacramento, CA 95814

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET
SACRAMENTO, CALIFORNIA 95814



March 11, 1985

Mr. Thomas W. Hayes, Auditor General
Office of the Auditor General
660 J Street, Suite 300
Sacramento, CA 95814

Dear Mr. Hayes:

We have reviewed your report entitled, "The State Committed \$50 Million to Build the South Geysers Geothermal Power Plant Without Assuring that Sufficient Steam Was Available." The report is factual and well written. We do not disagree with the analysis or conclusions. The Commission is modifying the power plant siting regulations to require a steam determination for all geothermal projects.

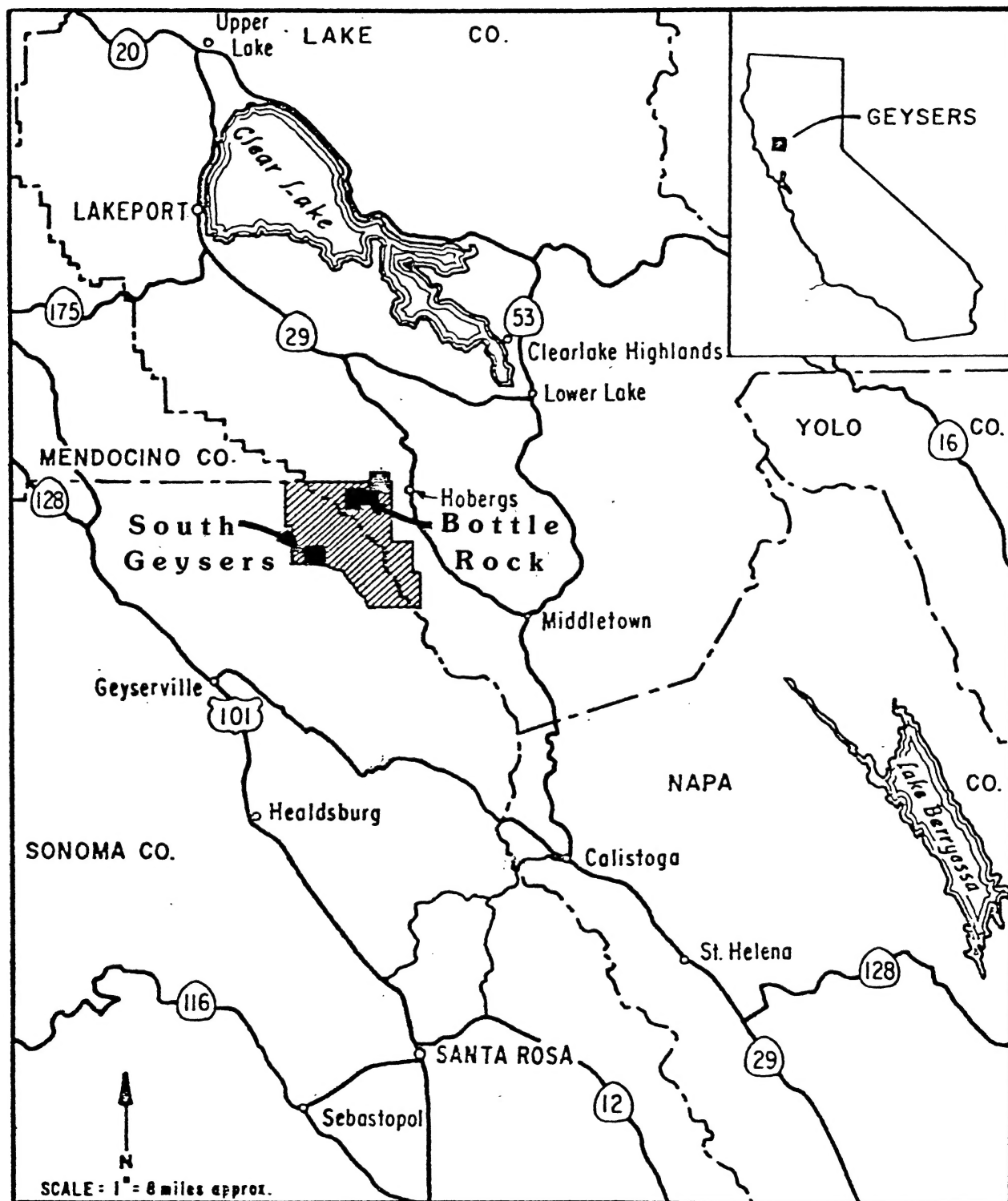
Thank you for the opportunity to review the report prior to its release.

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read "Charles R. Imbrecht".

CHARLES R. IMBRECHT
Chairman

MAP OF THE GEYSERS AREA



cc: Members of the Legislature
Office of the Governor
Office of the Lieutenant Governor
State Controller
Legislative Analyst
Assembly Office of Research
Senate Office of Research
Assembly Majority/Minority Consultants
Senate Majority/Minority Consultants
Capitol Press Corps

SUMMARY

The State committed \$50 million to build the South Geysers geothermal power plant without assuring that sufficient steam was available. Furthermore, the plant will not operate as scheduled in June 1986. The Department of Water Resources (department) did not adequately test the supply of steam before deciding to build the plant and has recently determined that the property does not contain enough steam to operate the plant at full capacity. Therefore, the department unnecessarily risked \$50 million of water users' funds on a project that may not have enough steam to operate at its full capacity. Further, the department has delayed completion of the plant, and users of water from the State Water Project will, therefore, pay an estimated \$2.9 million more for the plant than originally planned. The State Energy Resources Conservation and Development Commission did not require the department to prove that sufficient steam existed for the plant before it authorized the plant's construction in 1981.

In 1977, the department entered into an agreement with Geothermal Kinetics, Inc. (GKI), to purchase steam to operate the proposed South Geysers power plant in Sonoma County. In 1979, the department decided to build the power plant because tests of steam wells on the property performed for the steam supplier, GKI, indicated that sufficient steam was available to operate the plant and because certain other wells already in the area were supplying sufficient steam. However, the department did not obtain an independent analysis to determine if there was enough steam on the property to operate the plant for 30 years at its rated capacity of 55 megawatts. Other builders of geothermal power plants have made similar agreements to purchase steam, but builders we contacted said that they would not make commitments to build power plants until they had received assurances from independent consultants that sufficient steam existed to operate the plants.

III

CONCLUSION AND RECOMMENDATIONS

The Department of Water Resources has committed \$50 million to build the South Geysers geothermal power plant. However, the department did not adequately test the supply of steam on the property before deciding to build the plant. The department has recently determined that the property does not contain enough steam to operate the plant at full capacity. As a result, the department unnecessarily risked \$50 million of water users' funds on a project that may not have enough steam to operate at its planned capacity. Further, the department has delayed completion of the plant, and those using water provided by the State Water Project will pay an estimated \$2.9 million more for the plant than originally planned.

The State Energy Resources Conservation and Development Commission authorized construction of the South Geysers project. However, because the department applied for the authorization under the commission's 18-month process, the commission did not require assurances that enough steam would be available to operate the plant.

RECOMMENDATIONS

The Department of Water Resources should explore all available options for obtaining sufficient steam to operate the South Geysers plant at its designed capacity and should obtain firm commitments for